

Mathematics - Problem Solving Strategy

The “Listing / Table” Strategy

Adapted from:

梁易天, 劉應泉. (2008). 新一代數學第二版-數學解難訓練冊 - 小五 (第二版). 香港: 朗文香港教育.

Definition 定義

The “Listing / Table” Strategy is used when the information given is complicated and the criteria seem not clear or relevant. So we need to organize the information given by the questions into a table to show clear relationships and help us to understand the problem better.

Problem 1

There are 115 apples. Is it possible to put them onto 15 plates, if there must be at least 1 apple on the plates and the number of apples on each plate must be different?

(Notes: We have to put whole apples onto each plate, cannot cut the apple into halves or quarters, etc.)

Solution

If we have to put different number of apples onto the 15 plates, we need to put 1, 2, 3...15 apples respectively onto each plate.

+	1	2	3	4	5	6	7	8
	15	14	13	12	11	10	9	
Total	16	16	16	16	16	16	16	8

Total number of apples needed: $16 \times 7 + 8 = 112 + 8 = 120$

From the above table and calculation, we know that we need at least 120 apples. So it is impossible to put 115 apples onto 15 plates and make sure each plate has a different number of apples.

Answer 答案

This is impossible.

這是辦不到的。

Problem 2

Humble Pie

In training for the 'Pie Eating Contest', Big Bill eats five pies the first day, ten the next, and so on, adding five more each day as he becomes better trained. How many days would Bill train until he used up all his 330 practice pies?



Study the following table:

Number of D (d)	1	2	3	4	5	6	n	11
Number of pie being eaten each day (P)	5	10	15	20	25	30	5n	55
Total number of pie being eaten (T)	5	15	30	50	75	105	$5(1+2+3+..+n)$	330

Solution

- 2a. How many pies will be eaten on Day 5 and Day 6?
- Write the answer in the above table.
 - Explain the general rules you are using to find the answer for 2a.
5 times the number of day
 - Express the relationship of number of days (d) and number of pie being eaten each day (P) in mathematical formula.
 $P=5d$
- 2b. What is the total number of pie will be eaten on Day 5 and on Day 6?
- Write the answer in the above table.
 - Explain the general rules you are using to find the answer for 2b.
Add the number of pie eaten each today to the total number of pie eaten form the previous day.
Day 5=25+50=75
Day 6=30+70=105
 - Express any relationship you have notice between number of days (d) and total number of pie being eaten (T) in mathematical formula.
 $T_1=5 \times (1)=5$
 $T_2=5 \times (1+2)=5 \times 3=15$
 $T_3=5 \times (1+2+3)=5 \times 6=30$
 $T_4=5 \times (1+2+3+4)=5 \times 10=50$
 $T_5=5 \times (1+2+3+4+5)=5 \times 15=75$
 $T_6=5 \times (1+2+3+4+5+6)=5 \times 21=105$
 $T_d=5(1+2+3+...+d)$
- 2c. How many days will Bill train until he used up all his 330 practice pies?
(Hint: use the mathematical formula you have found from 2a and 2c)
Show your working clearly and explain your answer.

$$\begin{aligned} 330 &= 5(1+2+3+...+d) \\ 66 &= (1+2+3+...+d) \\ 66 &= (1+2+3+4+5+6+7+8+9+10+11) \end{aligned}$$

Therefore, $d = 11$

Bill will train 11 days until he used up all his 330 practice pies.